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EXAMINER

TAKEUCHI, YOSHITOSHI

ART UNIT

PAPER NUMBER

1793

NOTIFICATION DATE

DELIVERY MODE

05/26/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 12, 2009 has been entered.
2. Claims 1-16 are presented for examination, wherein claims 1 and 13 are currently amended and claims 2 and 14 are cancelled.
3. The 35 U.S.C. § 102(b) rejections of claims 1 and 3-16 are withdrawn as a result of the amendments and cancellation to the present claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
5. The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
 1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
7. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al. (WO 03/026835 A1, with specific references made through Saito et al. (US 2004/0250919) in view of Ono et al (US 2003/0047034).
 - a. Regarding claim 1, Saito teaches a solder flux composition (abstract) for use in electronic components (paragraph 0002) and a method of soldering using the same, wherein the liquid substance contains a flux component (abstract) and a tin alloy (paragraph 0111, where the solder powder may be of any kind, including Sn/Pb, Sn/Ag, Sn/Ag/Cu, Sn/Cu, Sn/Zn, Sn/Zn/Bi, Sn/Bi, or Sn/In, which is similar to the solder powder composition described in the Specification, p.9, line 10), where the flux reaction temperature is close to the melting point of the solder particle (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some SnIn₅₂ soldering alloys is known to be 118°C and the melting temperature of some SnBi₅₈ soldering alloys is known to be 138°C); the flux component reacts at a melting point of the solder particles (Table 1, where the flux reaction temperatures is 100 ° C to 120° C.

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The soldering temperature of some SnIn_{52} soldering alloys is known to be 118°C); the mixture of the liquid substance and solder particles has a viscosity that flows at room temperature (Paragraph 0117, where Saito teaches a solder paste which can be applied by “flowing or dipping,” paragraph 0118, where the method of soldering may be “performed by an ordinary method under ordinary conditions, and Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); the solder particles are mixed in the liquid substance at room temperature (paragraph 0113, where mixing may be performed at any temperature, but preferably at 5 to 25°C); the mixture of liquid substances and solder particles having viscosity that flows at a normal temperature and that deposits in layers on a base material (abstract); and the solder particles are granular agents (paragraph 0018) that precipitate in the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), having a mixing ratio and a particle diameter to be uniformly dispersible within the liquid substance (paragraph 0117, inherent characteristic of a tin solder powder, since a non-uniform dispersion would cause unacceptable amounts of failures in the electronic components due to non-uniform bump beads). However, Saito does not expressly teach a mixing ratio of the solder particles is less than or equal to 30wt%.

Ono teaches a solder paste (paragraph 0015) composed of fine tin alloy particles (paragraph 0042) dispersed in an organic compound (paragraph 0043), where a ratio is used of 0.1-100 grams of solder metal to 100 grams of dispersing medium, which

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includes 0.1 grams of solder metal to 100 grams of dispersing medium (cf the claimed mixing ratio of the solder particles equal to or less than 30wt%).

As a result, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the ratio of 0.1 grams of solder metal to 100 grams of dispersing medium, as disclosed by Ono in the solder composition of Saito, in order to disperse fine tin particles in low concentrations in the dispersing medium and be useful as a soldering paste, as the lower concentrations of tin alloy is an alternative to the higher concentration of tin alloy soldering paste, as disclosed by Ono.

The preamble limitation of “uniform” is treated as intended use, and is not given patentable weight. See MPEP § 2111.02(II). In addition, Saito teaches mixing the flux component (paragraph 0109), therefore a "uniform mixture" would be a degree of mixing and therefore obvious. See MPEP § 2114.05(II).

b. Regarding claim 3, Saito in view of Ono teaches the composition of claim 1, wherein Saito teaches the solder particle diameter less than or equal to 35um. (Paragraph 0111, teaching spherical particles with 20 micron diameters).

c. Regarding claim 4, Saito in view of Ono teaches the composition of claim 1, wherein Saito contemplates the solder particle with an oxide film is created without additional treatment, since Saito provides for an optional antioxidant. (Paragraph 0115).

d. Regarding claim 5, 6, and 7, Saito in view of Ono teaches the composition of claim 1, wherein Saito teaches the use of a liquid flux composed of fatty acid, of which at least some would be "free fatty acids" since they are not attached to other molecules. (Paragraph 0041). By the applicant's admission, free fatty acids accelerates the soldering

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between the solder particles and the base material and accelerates coalescence of the solder particles with the solder coating formed on the base material while suppresses coalescence of the solder particles by the reaction product thereof. (Specification p.16, line 19 to p.17, line 1).

e. Regarding **8**, **10**, and **12**, Saito in view of Ono teaches the composition of claim 1, wherein Saito teaches a liquid flux is composed of fatty acid ester (paragraph 0037), and acid numbers from 2.1 (Table 1) through 15.3 (Table 4).

f. Regarding claims **9** and **11**, Saito in view of Ono teaches the composition of claim 8, wherein Saito teaches a liquid flux comprised of a neopentyl polyol ester. (Paragraph 0037-0040).

8. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saito et al (WO 03/026835 A1 with specific references made through Saito et al (US 2004/0250919).

a. Regarding claim **13**, Saito teaches a method of forming bumps comprising: deposition for depositing on a base material a solder composition including a mixture of a liquid substance with flux component (abstract) whose reaction temperature is close to the melting point of the solder particles (Table 1, where the flux reaction temperatures is 100°C and 120°C. The soldering temperature of some SnIn₅₂ soldering alloys is known to be 118°C and the melting temperature of some SnBi₅₈ soldering alloys is known to be 138°C) having such a viscosity that flows at normal temperature and that deposits in layers on a base material (paragraph 0117, where Saito teaches a solder paste which can be applied by “flowing or dipping,” paragraph 0118, where the method of soldering may be “performed by an ordinary method under ordinary conditions, and

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Table 1, synthesis example 3 and paragraph 0122, where one embodiment expressly taught has a viscosity of 0.1 poise at 25°C); and solder particles that precipitate through the liquid substance towards the base material (inherent characteristic of a tin powder suspended in an organic liquid under the influence of gravity), and that have a mixing ratio and a particle diameter to be uniformly dispersible within the liquid substance (paragraph 0117, inherent characteristic of a tin solder powder, since a non-uniform dispersion would cause unacceptable amounts of failures in the electronic components due to non-uniform bump beads); reflow step for heating the solder composition and forming bumps made up of solder particles on the base material (paragraph 0117); and wherein the solder particles are uniformly dispersed in the liquid substance by stirring the solder composition in a pre-stage of the deposition (paragraph 0109).

b. Regarding claim **15** and **16**, Saito teaches the method of claim 14, wherein flowing the flux component or dipping the substrate into the flux composition (paragraph 0117), and spin coating is a well known method of flowing a chemicals across a substrate to achieve a uniform thickness of chemical over the substrate in the semiconductor and electronic arts.

Response to Arguments

8. Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection. The applicant made three arguments.

a. First, the applicant argues the ratio of solder metal to dispersing medium in the Ono reference does not read on revised claim 1.

In response, please refer to the revised rejection of claim 1 *supra*.

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b. Second, the applicant argues Saito teaches away from combining with Ono in the cited range.

In response, the operative words in the Saito reference is "preferred," where the reference teaches, "[w]ith less than 50 wt % or more than 99 wt % solder powder, required solder printability is not obtained, thus not preferred." (Paragraph 0113, emphasis added). While a ratio of solder particles of less than 50% solder particles might not be preferable, a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Preferred embodiments do not constitute a teaching away from the broad disclosure, which includes solder powder at less than 50 wt%. In re Susi, 440 F.2d 442 (CCPA 1971). See also MPEP 2123(II).

c. Third, the applicant argues by referencing (0092) of Ono that the combination of Saito and Ono fails to disclose each and every element of the pending claims.

In response, (0092) of Ono is one embodiment of the invention taught by Ono. In paragraph 0078, Ono teaches a mixing ratio of metal within the "range of 0.1 to 100 g, preferably 1 to 50, more preferably 2 to 20g per 100 g of the particle dispersion medium." This is within the instantly claimed range; a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Preferred embodiments do not constitute a teaching away from the broad disclosure, which includes solder powder at less than 50 wt%.. In re Susi, 440 F.2d 442 (CCPA 1971). See also MPEP 2123(II). Preferred embodiments do not

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constitute a teaching away from the broad disclosure which includes solder powder at less than 50 wt%.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YOSHITOSHI TAKEUCHI whose telephone number is (571) 270-5828. The examiner can normally be reached on Monday-Thursday 9:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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1793

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